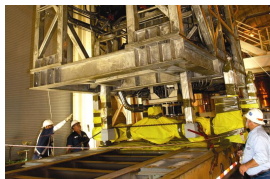
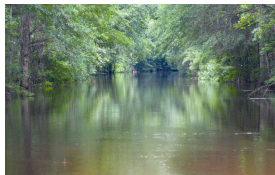




Instrument Interfacing Success Stories



**Rob Clark
Senior Engineer
Westinghouse Savannah River
Company
August 16, 2005**

WSRC-TR-2005-00359

Instrument Interfacing Success Stories

Background

- **Savannah River Site is a Department of Energy Facility**
- **Located in Aiken, SC**
- **Primary work is environmental restoration**
- **Multiple laboratories across the Site**
 - Ranging from large to small labs doing a variety of work

Instrument Interfacing Success Stories

Background

- **Most of our instruments are tied into LIMS**
- **Minimal input from users**
- **Faster**
- **Minimize errors**
- **Use Off-the-Shelf software as much as possible**

Instrument Interfacing Success Stories

Background

- **ICP's – Perkin Elmer Optima 3000 XL, Optima 4300 DV**
- **ICP's – Leeman Labs Profile Plus**
- **Gas Flow Proportional Counter – Oxford Tennelec**
- **Alpha Spectrometer – Canberra Alpha Analyst**
- **Liquid Scintillation Counter – Packard Bioscience TriCarb 2500TR**
- **Gamma Spectroscopy - Canberra**

Instrument Interfacing Success Stories

ICP's (EM)

- Lab has two ICP's – Perkin Elmer Optima 3000 XL, and Optima 4300 DV
- Processes 500 analyses per year

Workflow –

Log samples in LIMS

Run the analysis on the instrument

Copy the data file to predefined directory

A LimsLink method parses the data file

Technician reviews, edits

Technician sends results to LIMS.

Results available in LIMS



Instrument Interfacing Success Stories

ICP's (EM)

- Automatic <30 seconds per sample
- Manual data entry ~3 minutes (and a chance of human error)

Instrument Design Module - LimsLink v3.1 - [ICP GW (3000 XL):00000455]								
System WorkSheet Samples Security Options Window Help								
Close								
ICP GW (3000XL)								
Dilution Factor	1.00	Unit of Analysis	ug/L	Verifier Initial	BLACK	Analysis Method	EPA6010B	Prep Meth:
		Archive Label		Analyst Initial	BLACK	ICP batch name	I04I29A	Prep Date
LIMS Sample ID	User Sample ID	Ag 328	Al 308	As 188	B 182	E		
1 200018933	LB (ICP)	0.00056835	0.18854925	0.00157223	-0.0081702	0		
2 200018934	LCS (ICP)	-0.0001562	0.82759975	0.00296217	-0.0034974	0		
3 200018935	LCSD (ICP)	-0.0001898	0.07708753	0.00375258	0.00223696	0		
4 200018912	LFW 29/04-827006-00	-0.0001996	0.59594734	0.0026309	-0.0019158	0		
5 200018936	LAB DUP (ICP)	0.00036777	0.03344162	0.00349231	-0.0048995	0		
6 200018911	LFW 28/04-827004-00	0.00034037	0.06605193	0.00073184	-0.0009111	0		
7 200018937	MS (ICP)	0.0000796	0.13819054	0.0009088	-0.0088872	0		
8 200018938	MSD (ICP)	-0.0000737	0.01343497	0.00192927	-0.0057578	0		
9 200018913	LFW 30/04-827008-00	0.00024955	0.00657782	0.00201766	-0.010848	0		
10 200018914	LFW 31/04-827010-00	0.00029458	0.02918803	0.00111581	-0.0082767	0		
11 200018915	LFW 32/04-827012-00	0.00025134	0.0318742	0.00059929	-0.0082034	0		
12 200018916	LFW 34/04-827016-00	0.00008495	0.00792962	0.00116092	-0.0072098	0		
13 200018917	LFW 43B/04-827018-00	-0.000013	0.01684761	0.00217577	-0.0110163	0		
14 200018918	LFW 43C/04-827020-00	0.00008997	0.00858009	0.00152926	-0.0084378	0		
15 200018919	LFW 43D/04-827022-00	0.00009772	0.02321519	0.00230563	-0.0135581	0		
16 200018920	LFW 44D/04-827024-00	-0.0002503	0.07889534	-0.0007511	-0.0126425	0		

Instrument Interfacing Success Stories

IDM-3 LIMSLINK

- **Almost all instruments tied in to LIMS via IDM-3 LIMSLink**
- **Commercial product, vendor specific add-ins available**
- **Create “methods” that correspond to instrument data files**
- **Cost \$1200 per method per computer**
- **Our Add-ins: \$200 / per instrument**
- **Annual cost: \$180 / instrument, \$450 for add-ins (bulk)**
- **Development time varies, depending on complexity (1 week to months)**

Instrument Interfacing Success Stories

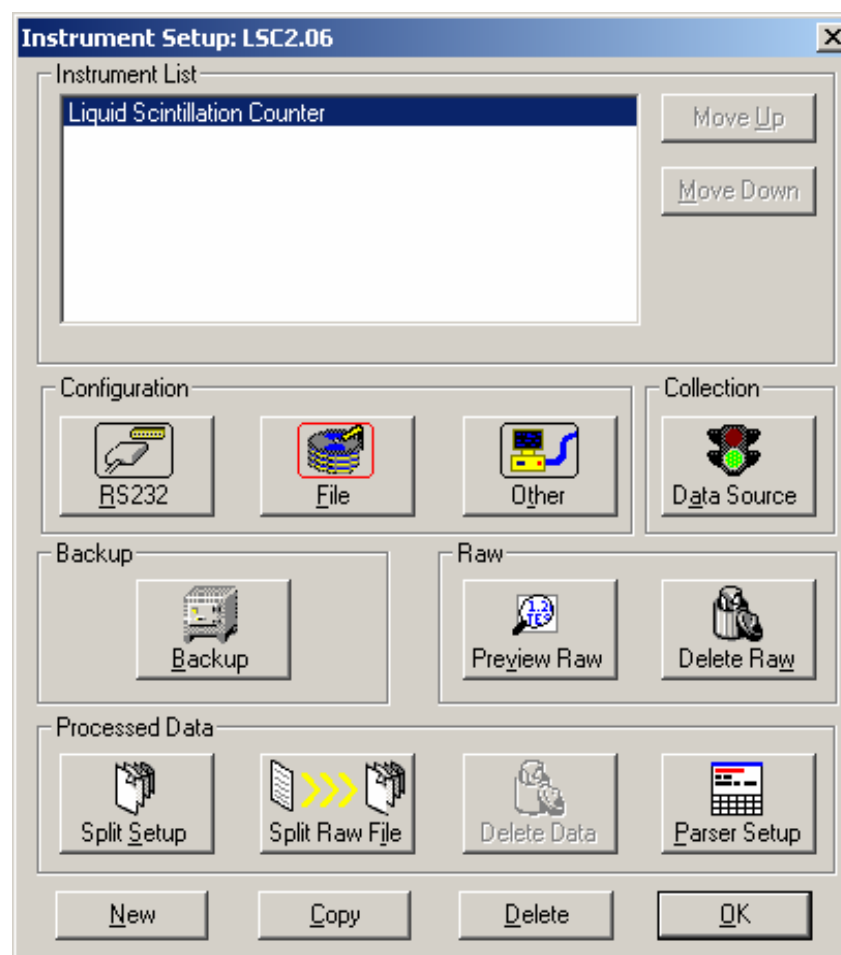
IDM-3 LIMSLINK

- Instrument setup

Serial port

File

Other (network)



Instrument Interfacing Success Stories

IDM-3 LIMSLINK

- Split setup
- Define what makes up one sample or run
- Can be a single line or multiple lines

Split Setup: Liquid Scintillation Counter

☒ Data Collection Timeout

☒ Absolute Number of Lines
of Lines per Sample: 1

☒ Split Header
of Lines: 1
☒ One Header per Run
☐ One Header per Timeout

☐ Search String

	Type	String	Locatio	Start	Skip	OffSet
1	Match			0	0	0
2						
3						
4						

EOL Character: CRLF

Min. File Size: 1 Bytes

☐ Add Status Line

IDM-3 LIMSLINK

-
- The screenshot displays the 'Parser Setup' window for 'LSC2.06: LSC Count Data Parser'. The window includes a menu bar (File, Edit, Options, Spreadsheet) and a toolbar with various icons. The 'Raw - Step 1 - Defined (C2:A12)' section shows the following settings:
- Start: POSITION
 - End: ROWDELIM
 - Parser: d:/.....
 - Reps: 1
 - ☐ File Transfer
- Below the settings is a yellow-highlighted text area containing the following data:
- ```
3,3,3,38.07,7.25,0,4.88,0,0,752.014,91.16,.0000001,62,#,394.527,
```
- A circular callout is positioned over the first '3' in this sequence. A blue arrow originates from this callout and points to the 'CTime' column header in the spreadsheet below.
- The spreadsheet has columns labeled C through H. Row 2 is highlighted in blue. The data in Row 2 is as follows:
- |   | C | D   | E  | F     | G     | H    |
|---|---|-----|----|-------|-------|------|
| 1 | P | PID | S# | CTime | CPMA  | A2S  |
| 2 | 3 | 3   | 3  |       | 38.07 | 7.25 |
| 3 |   |     |    |       |       |      |
| 4 |   |     |    |       |       |      |
| 5 |   |     |    |       |       |      |
| 6 |   |     |    |       |       |      |
| 7 |   |     |    |       |       |      |

# Instrument Interfacing Success Stories

## IDM-3 LIMSLINK

- Display setup
- Similar to MS Excel
- Functions, rows, columns
- Links from the Single Sample Spreadsheet to the Worksheet

Display Setup: LSC2.06

File Options

|    | B              | C                  | D               | E                 | F                 | G                   | H                   |
|----|----------------|--------------------|-----------------|-------------------|-------------------|---------------------|---------------------|
| 1  |                | P                  | PID             | S#                | CTime             | CPMA                | A2S                 |
| 2  |                | 3                  | 3               | 3                 | 20                | 38.07               | 7.25                |
| 3  |                |                    |                 |                   |                   |                     |                     |
| 4  |                |                    |                 |                   |                   |                     |                     |
| 5  |                |                    |                 |                   |                   |                     |                     |
| 6  |                |                    |                 |                   |                   |                     |                     |
| 7  |                |                    |                 |                   |                   |                     |                     |
| 8  |                |                    |                 |                   |                   |                     |                     |
| 9  |                |                    |                 |                   |                   |                     |                     |
| 10 | Count_Time     | Count_Date_Time    | LSC Unit Number | CPMA              | CPMB              | DPMA                | DPMB                |
| 11 | RETENTION TIME | DATE-TIME          | TEXT            | COUNTS PER MINUTE | COUNTS PER MINUTE | DISINTEGR. PER MIN. | DISINTEGR. PER MIN. |
| 12 | Minutes        | MON-YYYY HH24:MI:S | None            | cpm               | cpm               | dpm                 | dpm                 |
| 13 | 20             | 05-Aug-2004 14:13  | LSC 205         | 38.07             | 0                 | 91.16               | 0.0000001           |
| 14 |                |                    |                 |                   |                   |                     |                     |

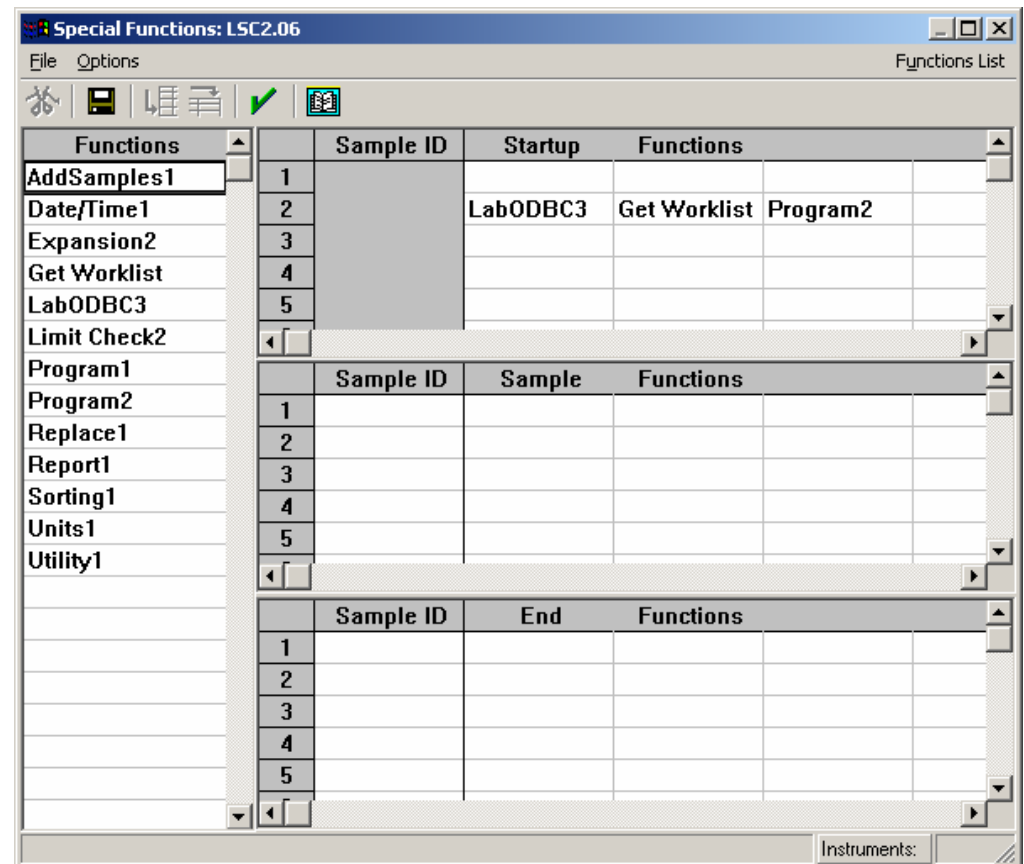
**LSC COUNT SAMPLE DATA**

| LIMS Sample ID | User Sample ID | Task ID | Count_Date_Time   | Count_Time | LSC Unit Number | CPMA  | CPMB | DPMA  | DPMB |
|----------------|----------------|---------|-------------------|------------|-----------------|-------|------|-------|------|
|                |                |         | 05-Aug-2004 14:13 | 20         | LSC 205         | 38.07 | 0    | 91.16 |      |

# Instrument Interfacing Success Stories

IDM-3 LIMSLINK

- Special Functions
- Date and time conversion
- Unit conversion
- Sorting
- Get worklist add-in
- LabODBC add-in
- Program 2 add-in



# Instrument Interfacing Success Stories

## IDM-3 LIMSLINK

- Report
- OK for end user reports
- Real use – creating a SQL\*LIMS Automatic Results Entry (ARE) file
- Automatically sent to LIMS for processing

Report Setup: ARE SQL\*LIMS

File Options

|    | A                    | B                 | C                    |          |
|----|----------------------|-------------------|----------------------|----------|
| 7  | Result Change Reason |                   |                      |          |
| 8  | LIMS Jobtype         |                   |                      |          |
| 9  | Archive Label        |                   |                      |          |
| 10 | Component            | Count_Time        | Count_Date_Time      | LSC Unit |
| 11 | Measure              | RETENTION TIME    | DATE-TIME            | TE       |
| 12 | Units                | Minutes           | -MON-YYYY HH24:MI:SS | No       |
| 13 | Result               | 05-Aug-2004 14:13 | LSC                  |          |
| 14 |                      |                   |                      |          |
| 15 |                      | P#                | PID                  | Sam      |
| 16 |                      | 3                 | 3                    | 3        |

TASK\_ID

ENTER\_RESULTS

TASK\_REPETITION

CHANGE\_REASON

COMPONENT

VOLUME

END\_COMPONENT

CHANGE\_REASON

COMPONENT

RETENTION TIME

END COMPONENT

Aliquot Amount

mL

Count\_Time

Minutes

"TRANSCRIPTION ERROR"

# Instrument Interfacing Success Stories

## Liquid Scintillation Counter

- **Four Counters**
- **High volume – 6000 samples per year**
- **Environmental samples**
- **Average time per sample via automation ~ 20 seconds**
- **Average time per sample by hand estimated at 15 min**



# Instrument Interfacing Success Stories

## Liquid Scintillation Counter

- **Visual Basic component**
- **Preprocesses data**
- **Combines with batch information**
- **User interface for instrument used, count type**
- **Calculates %Recovery, QC blank check**
- **Starts IDM-3 LIMSLink method**

# Instrument Interfacing Success Stories

## Liquid Scintillation Counter

- **IDM-3 LIMSLink component**
- **Parses the combined data from the VB component**
- **Gets aliquot size, decay data from database**
- **Calculations and determinations**
- **Sends selected data to the LIMS**



# Instrument Interfacing Success Stories

## Liquid Scintillation Counter

### **Workflow –**

**Log samples in LIMS**

**Run the analysis on the instrument**

**Copy the data file to predefined directory**

**Run the VB program from an icon**

**Enter additional data**

**In IDM-3 LIMSLink, run get worklist function, LabODBC function, NAD  
Calculation function**

**Technician reviews, edits**

**Technician sends results to LIMS.**

**Results available in LIMS**

# Instrument Interfacing Success Stories

ICP's (DWPF)

- Lab has two ICP's – both Leeman Labs Profile Plus
- Process 1640 runs per year (86,500 results)
- Saves 1-1/2 hour per run, plus verification time
- Interface to a custom LIMS (i.e. - no add-ins available)
- Written entirely in Java
- Cleanest interface, but required custom programming
- Four weeks to write, test, deploy

# Instrument Interfacing Success Stories

## ICP's (DWPF)

### Workflow –

Log samples in LIMS

Run the analysis on the instrument

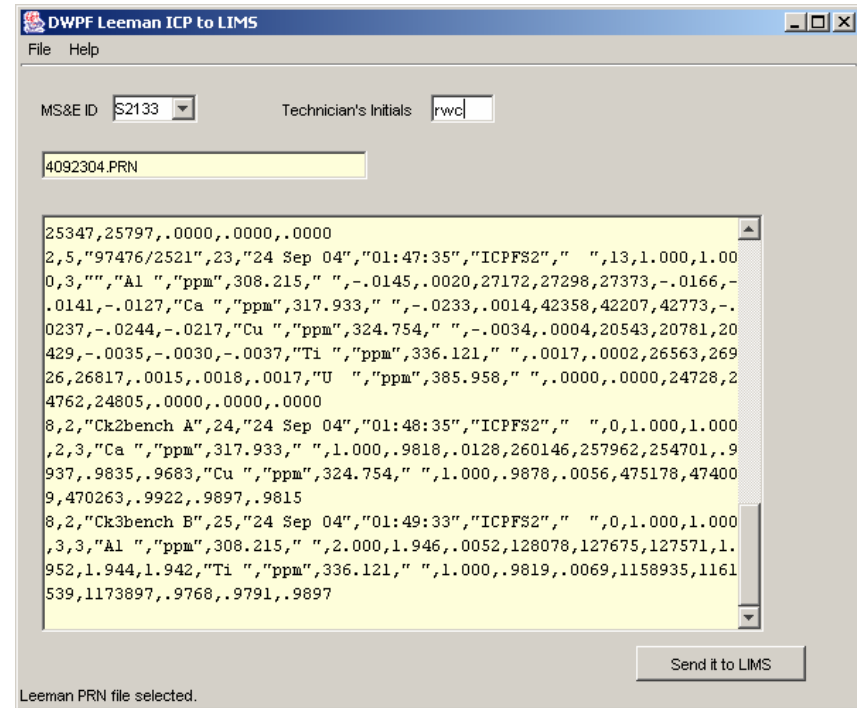
Copy the data file to predefined directory

Technician opens file, add MS&E ID

The interface application parses the data file

Technician sends results to LIMS.

Results available in LIMS



# Instrument Interfacing Success Stories

## Conclusion

- **Wide variety of instruments interfaced**
- **Common thread – machine readable report from instrument**
- **Varying degrees of work required to interface**
- **All save data entry time and errors**